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APPLICATION FOR UNITED STATES LETTERS PATENT

FOR

Wireless Digital Picture Display Frame

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Wireless Digital Picture Display Frame

BACKGROUND OF THE INVENTION

5 1. **Field of the Invention**

The present invention relates to the fields of digital picture. More specifically, the present invention relates to display apparatuses for digital pictures.

10 2. **Background Information**

As advances in microprocessor and other related technologies continue to improve the price/performance of various electronic components, digital pictures, which as used herein include all amateur as well as professional digital
15 renditions employing digital computers, cameras and the like, have become increasingly popular in recent years. Powerful personal computers including versatile painting and graphics layout software can now be purchased in only
fraction of the price one would have to pay in just a handful of years earlier. Similarly, numerous relatively inexpensive but yet functionally rich digital cameras
20 are now available in the market place. They are being used by amateur photographers for day-to-day routine casual photography as well as by professional photographers including photo journalists and artists for serious journalistic and

artistic works.

Notwithstanding the superior versatility of these digital pictures over conventional artwork and film based photographs, most consumers of digital pictures produced by commercial artists as well as casual users of digital cameras, continue to display these digital pictures in the conventional manner, that is through prints of the renditions. The conventional approach suffers from a number of disadvantages, including the disadvantages of requiring manual mounting of each print, and remounting if a user desires to display a different print. Thus, a more efficient and cost effective way of displaying digital picture is desired.

SUMMARY OF THE INVENTION

A wireless digital picture display frame is disclosed. The display frame includes a wireless receiver that operates to receive digital pictures, a flat-panel display that operates to render the digital pictures, and a processor that operates to control the receiving and rendering of the digital pictures. The display frame further includes a frame with constructs that encircle the flat panel display, and form a housing to house the enumerated components.

10 In different embodiments, the digital pictures may be digital painting/graphics renditions or digital photographs. The display frame may further include either hanging features that facilitate hanging of the digital display frame, or support features that facilitate flat surface placement of the digital display frame.

BRIEF DESCRIPTION OF DRAWINGS

The present invention will be described by way of exemplary
embodiments, but not limitations, illustrated in the accompanying drawings in which
5 like references denote similar elements, and in which:

Figures 1a-1b are front and side views of a wall mount embodiment of
the digital picture display frame of the present invention;

Figures 2a-2b are front and side views of a flat surface placement
embodiment of the digital picture display of the present invention;

10 **Figure 3** illustrates one embodiment of the internal architectural of the
digital picture display frames of **Figs 1a-1b** and **2a-2b**; and

Figure 4 is a block diagram illustrating one embodiment of the
operational flow of the control logic provided to the processor of **Fig. 3**.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, various aspects of the present invention will be described. Those skilled in the art will also appreciate that the present invention
5 may be practiced with only some or all aspects of the present invention. For purposes of explanation, specific numbers, materials and configurations are set forth in order to provide a thorough understanding of the present invention. However, it will also be apparent to one skilled in the art that the present invention may be practiced without the specific details. In other instances, well known features are omitted or
10 simplified in order not to obscure the present invention.

Referring now to **Figures 1a – 1b, 2a - 2b, and 3**, wherein two embodiments of the digital picture display frame **100** and **100'** of the present invention are shown. **Figures 1a – 1b** are front and side views of a wall mount
15 embodiment **100**, whereas **Fig. 2a - 2b** are front and side views of a flat-surface placement, such as table top, embodiment **100'**. **Figure 3** illustrates one embodiment of the internal architectural of display frame **100** and **100'**.

As shown, digital picture display frame **100** or **100'** of the present
20 invention includes wireless receiver **102** that operates to receive digital pictures from a remote external source, flat panel display **104** that operates to render the received digital pictures, and processor **106** that operates to control said receiving and

rendering of the digital pictures on flat panel display **104**. Wireless receiver **102**, flat panel display **104**, and processor **106** are coupled to each other by way of bus **108**. Additionally, wireless receiver **102** is also coupled to interrupt processor **106** whenever it receives signals from a remote transmitter, e.g. the remote transmitter
5 of the external source supplying display frame **100** or **100'** with the digital pictures. These components **102 – 108** are disposed on printed circuit board **112**.

For each of the illustrated embodiments, digital picture display frame **100** or **100'** also includes non-volatile memory **110** that operates to store the
10 received digital pictures. Non-volatile memory **110** is also coupled to wireless receiver **102**, flat panel display **104** and processor **106** by way of bus **108**; and disposed on printed circuit board **112**. In alternate embodiments, the present invention may be practiced without non-volatile memory **110**. For these alternate
15 embodiments, digital picture display frame **100** or **100'** is provided with a digital picture each time it powers on. For other embodiments, digital picture display frame **100** or **100'** is further provided with the same or new digital pictures periodically thereafter.

For each of the illustrated embodiments, display frame **100** also
20 includes a number of constructs, such as horizontal and vertical frame elements **114** and **116**, and back plate **118**, that encircle flat panel display **104**, and form a housing to house the above enumerated components, i.e. wireless receiver **102**,

processor **106**, and so forth.

Additionally, for the wall mounted embodiment, display frame **100** also includes hanging features **120** for facilitating hanging of display frame **100**, whereas
5 for the flat surface placement embodiment, display frame **100'** also includes support features **122** for facilitating flat surface placement of display frame **100'**, e.g. on a table top, a dresser top and so forth. Hanging features **120** and support features **122** may be any one of a number of these features known in the art.

10 Digital pictures may be any digital painting/graphics renditions or digital photographs. The external source supplying the digital picture may be a digital camera, a palm computer, a laptop computer, a deskside computer or a desktop computer, equipped with an appropriate wireless transmitter for transmitting the digital pictures to display frame **100** or **100'**. As alluded to earlier, these external
15 sources may supply the same or different digital pictures periodically. In other words, a "slide show" of selected digital pictures may displayed.

As will be described in more details below, multiple ones of the digital picture display frame **100** or **100'** of the present invention may be employed in an
20 application, e.g. in a home application. In these applications, the external sources may supply different digital pictures to the different digital picture display frames **100** or **100'**. For example, in a home application, the digital picture display frames **100**

or **100'** in the living room may be provided with different digital pictures than those provided to digital picture display frames **100** or **100'** in the family room or bedroom.

Wireless receiver **102** is intended to represent a broad category of these receivers known in the art. Similarly, flat panel display **104** is also intended to represent a broad category of such displays known in the art, including and not limited to Processor **106** is intended to represent 8-bit or more microcontrollers (MCU), 16-bit or more digital signal processors (DSP), as well as 32-bit or more general purpose microprocessors (MP). Except for high end models with very high capacity and additional controls, it is expected that inexpensive 8-bit MCU will suffice.

Similarly, bus **108** and non-volatile memory **110** are intended to represent a number of these inexpensive components known in the art. In the case of non-volatile memory **110**, either block erasable flash memory, electrically erasable programmable read-only-memory (EEPROM), complementary metal oxide semiconductor (CMOS) memory or equivalent may be used. The amount of memory required is application dependent, that is dependent on the size, format and resolution of the digital picture supported. Except for high end models, it is expected that a small amount of today's inexpensive non-volatile memory will suffice.

Figure 4 illustrates one embodiment of the operational flow of the control logic provided to processor **106**. As shown, upon power on, processor **106** determines if it is operating in an embodiment equipped with non-volatile memory **110** or not, step **152**. If processor **106** is operating in an embodiment equipped with non-volatile memory **110**, processor **106** causes a stored digital picture to be rendered on flat panel display **104**, step **154**, and then proceeds to step **156**; else processor **106** skips step **154** and proceeds to step **156** directly. The displayed digital picture may be randomly chosen from the stored digital pictures or chosen in a predetermined manner, e.g. the first digital picture stored in non-volatile memory **110**.

At step **156**, processor **106** waits to be interrupted by wireless receiver **102**. Recall that wireless receiver **102** interrupts processor **106** when it receives signals transmitted by a remote transmitter, e.g. the remote transmitter associated with the external source supplying a digital picture to display frame **100** or **100'**. Upon interrupted by wireless receiver **102**, processor **106** proceeds to step **158** to determine if the signals received by wireless receiver **102** is intended for the particular display frame **100** or **100'**. If display frame **100** or **100'** is not the intended recipient, processor **106** ignores the signals received, and returns to step **156** where it waits to be interrupted by wireless receiver **102** again. On the other hand, if display frame **100** or **100'** is the intended recipient, and processor **106** is operating in an embodiment equipped with non-volatile memory **110**, processor **106** causes

the received digital picture to be stored in non-volatile memory 110, step 160. Upon saving the received digital picture, processor 106 proceeds to render the newly received digital picture, step 154. From step 154, processor 106 proceeds as described earlier. If display frame 100 or 100' is the intended recipient, and
5 processor 106 is not operating in an embodiment equipped with non-volatile memory 110, processor 106 proceeds to step 154 directly. In one embodiment, if step 160 is performed, it is performed concurrently with step 154.

In one embodiment, each display frame 100 or 100' is equipped with a
10 small non-volatile identification memory (not shown) for storing a unique identifier to uniquely identify the display frame 100 or 100'. For these embodiments, the remote external source includes at the beginning of its transmission an identifier identifying the intended recipient of the digital picture. Any one of a number of protocols may be employed to facilitate such identification process, which is well within the ability of
15 those ordinarily skilled in the art. Accordingly, as alluded to earlier, multiple display frames 100 or 100' of the present invention may be deployed in the transmission space of the remote transmitter, for example, in an office or in a residence.

In general, those skilled in the art will recognize that the present
20 invention is not limited by the details described; instead, the present invention can be practiced with modifications and alterations within the spirit and scope of the appended claims. In particular, various control features, such as forward, backward,

and the like may be provided to the wireless picture display frame of the present invention. The description is thus to be regarded as illustrative instead of restrictive on the present invention.

5 Thus, a wireless digital picture display frame have been described.
